

Remarks

The various parts of the Office Action (and other matters, if any) are discussed below under appropriate headings.

Priority

The Examiner's notation that the priority document had not yet been filed is noted with appreciation. The priority document has now been submitted to perfect the priority claim.

Amendments

By way of the foregoing amendments, claim 1 has been cancelled without prejudice and claims 2-5 have been amended to depend from 10. Consequently, the prior rejection of claims 1-5 is now moot. Claims 6-11 remain as previously presented, and it is respectfully submitted that these claims and claims 2-5 are patentable over the applied references at least for the following reasons.

Claim 6

The Examiner's rejection of claim 6 appears to be based on an incorrect interpretation of the claim. The Examiner states that claim 6 relates to a *"multiplexer comprising a plurality of multiplexing locations where the pump beams are multiplexed, the configuration being such that no more than one half the total power of the pump beams can interact at any one of the multiplexing locations"*. However, this is not an accurate description of the claim. Claim 6 discloses a modularized pump redundancy system, not a power splitter, as now explained.

The number of fiber couplers and the complexity of an MxN multiplexer increases with the number of pump lasers (M) used. An MxN multiplexer designed for use with a large number of pump lasers provides excellent levels of pump redundancy. However, it also requires a large number of fiber couplers, which cause substantial losses to be incurred due to the cumulative effects of splice and radiation loss. This problem is discussed further on page 9, paragraph 2 of applicants' detailed description.

According to claim 6, the MxN multiplexer is divided into a plurality of n $M_i \times N_i$ modules, (where $M_1 + M_2 + \dots + M_n = M$, and $N_1 + N_2 + \dots + N_n = N$). Each $M_i \times N_i$ module

receives inputs from M_i pump lasers, (where M_i is less than M) and provides power redundancy for N_i optically pumped fiber lasers (where N_i is less than N). In total the multiplexer modules require substantially less fiber couplers than would be required for a single $M \times N$ multiplexer, hence, the total loss of the system is substantially reduced.

The Examiner implies that the modularized pump system set forth in claim 6 has previously been disclosed in Brock. To the contrary, the routing module (114) of Figure 9 of Brock does not provide a pump redundancy scheme, but rather accepts a range of wavelengths from an array of lasers (112) and switches the individual wavelengths to a plurality of modulators. Column 12, lines 53-55 of Brock describes the purpose of the 1 to M switch (148), which comprises the first stage of the routing module, as "[it] switches its single input to only one of M outputs versus a splitter which splits the single into multiple outputs by power dividing the signal". Hence, Brock teaches away from the modularized $M \times N$ multiplexer disclosed in claim 6.

Claim 10

Claim 10 was rejected as obvious in view of a combination of Jiang, Giles and Ushirozawa.

Claim 10 recites a WDM transmitter with a power monitoring device, which measures the power at a point after the multiplexer, and a control unit, which controls the pump laser responsive to the measured power. The measuring of the power after the multiplexer allows the use of only *one* monitoring device and control unit to provide feedback for the whole system. This is possible because the summed output power of each of the pump lasers is divided equally amongst the outputs of the multiplexer. Therefore, a variation in the power of any pump laser will be detectable at all of the multiplexer outputs. This allows a substantial reduction of the cost and complexity of the WDM transmitter as only one power monitoring device and controller are needed regardless of the number of optically pumped fiber lasers.


By contrast, Ushirozawa requires a power monitoring device for each output branch (11_1 to 11_N), which is necessary because each output is operated by a light source (2_1 to 2_N) that operates at a different wavelength. Hence, Ushirozawa teaches away from the subject matter of claim 10.

Conclusion

For at least the foregoing reasons, the rejections of claims 6 and 10 should be withdrawn, in which case this application would be in condition for allowance.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, LLP

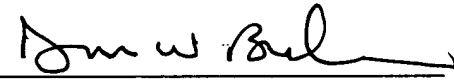
By 
Don W. Bulson, Reg. No. 28,192

1621 Euclid Avenue
Nineteenth Floor
Cleveland, Ohio 44115
(216) 621-1113

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Don W. Bulson

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